

## CLAIMS

What is claimed is:

1. A method comprising:  
inserting at least one null operation instruction in an instruction set; and  
recording information within a data field of the null operation instruction.
2. The method of claim 1 wherein the instruction set is an instruction set of a run-time system.
3. The method of claim 2 wherein the run-time system is a Java virtual machine.
4. The method of claim 3 wherein the information is live reference information for a garbage collection process.
5. The method of claim 4 wherein the number of null operation instructions inserted into the instruction set is determined by dividing a number of bits required to record the live reference information by a number of bits used as a data field in each null operation instruction.
6. A method comprising:  
determining at least one instruction of an instruction set to be a null operation instruction; and  
recording information within a data field of the null operation instruction.
7. The method of claim 6 wherein the instruction set is an instruction set of a run-time system.
8. The method of claim 7 wherein the run-time system is a Java Virtual Machine.
9. The method of claim 8 wherein the information is live reference information for a garbage collection process.

10. The method of claim 9 further comprising:

determining the number of null operation instructions available to be insufficient to record the live reference information; and

inserting at least one null operation instruction such that the number of null operation instructions is sufficient to record the live reference information.

11. An apparatus comprising:

a memory to store an instruction set, the instruction set having at least one null operation instruction inserted therein; and

a compiler to record information within a data field of the null operation instruction.

12. The apparatus of claim 11 wherein the instruction set is an instruction set of a run-time system.

13. The apparatus of claim 12 wherein the run-time system is a Java virtual machine.

14. The apparatus of claim 13 wherein the information is live reference information for a garbage collection process.

15. The apparatus of claim 14 wherein the number of null operation instructions inserted into the instruction set is determined by dividing a number of bits required to record the live reference information by a number of bits used as a data field in each null operation instruction.

16. An apparatus comprising:

a memory to store an instruction set;

a processor to determine at least one instruction of the instruction set to be a null operation instruction; and

a compiler to record information within a data field of the null operation instruction.

17. The apparatus of claim 16 wherein the instruction set is an instruction set of a run-time system.

18. The apparatus of claim 17 wherein the run-time system is a Java virtual Machine.

19. The apparatus of claim 18 wherein the information is live reference information for a garbage collection process.

20. The apparatus of claim 19 wherein the processor is further used to insert at least one null operation instruction upon determining the number of null operation instructions available to be insufficient to record the live reference information such that the number of null operation instructions is sufficient to record the live reference information.

21. A machine-readable medium that provides executable instructions which, when executed by a processor, cause the processor to perform a method, the method comprising:

inserting at least one null operation instruction in an instruction set; and  
recording information within a data field of the null operation instruction.

22. The machine-readable medium of claim 21 wherein the instruction set is an instruction set of a run-time system.

23. The machine-readable medium of claim 22 wherein the run-time system is a Java virtual machine.

24. The machine-readable medium of claim 23 wherein the information is live reference information for a garbage collection process.

25. The machine-readable medium of claim 24 wherein the number of null operation instructions inserted into the instruction set is determined by dividing a number of bits

required to record the live reference information by a number of bits used as a data field in each null operation instruction.

26. A machine-readable medium that provides executable instructions which, when executed by a processor, cause the processor to perform a method, the method comprising:

determining at least one instruction of an instruction set to be a null operation instruction; and

recording information within a data field of the null operation instruction.

27. The machine-readable medium of claim 26 wherein the instruction set is an instruction set of a run-time system.

28. The machine-readable medium of claim 27 wherein the run-time system is a Java virtual Machine.

29. The machine-readable medium of claim 28 wherein the information is live reference information for a garbage collection process.

30. The machine-readable medium of claim 29 wherein the method further comprises:

determining the number of null operation instructions available to be insufficient to record the live reference information; and

inserting at least one null operation instruction such that the number of null operation instructions is sufficient to record the live reference information.

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